



Materials Engineering Branch

TIP*



No. 096 Preparation of Aluminum for Critical Adhesive Bonding

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There are several general specifications for preparing metal surfaces for adhesive bonding. They include ASTM D-2651 and SAE-ARP 1842. Most major contractors have developed their own process specifications and most manufacturers of adhesives have developed recommended bonding processes for bonding with their products. Many of these processes are variations of what is commonly called the FPL etch that was developed by the Forest Products Laboratory. The following is a modification of this procedure that is more environmentally friendly:

1. Solvent clean.
2. Detergent clean in Brulin, Simple Green or an equivalent product followed by a thorough water rinse.
3. Immerse in alkaline cleaner for 15 minutes.
4. Rinse thoroughly with de-mineralized water. Check for a water-break free surface.
5. Immerse in sodium dichromate/sulfuric acid etch solution for 15 minutes.
6. Rinse thoroughly in de-mineralized water. Check for a water-break free surface.
7. Air dry with warm air.
8. Prime or bond the etched metal within 16 to 24 hours. A corrosion inhibiting primer is recommended. (Use only materials that are approved for space flight.)

Numerous manufacturers of aircraft and space hardware have successfully used the above procedure and variations of it for many years. The procedure is popular because it is fairly easy to follow and does not require an excessive amount of time or equipment.

Another acceptable surface preparation technique, phosphoric acid anodize (for example, SAE-ARP 1524) has also been used successfully. The reader is

cautioned against the use of any surface treatment without knowing its compatibility with any subsequent surface finish such as paint.

Also, be aware that the above surface treatments are for aluminum alloys only. Steel, titanium and other alloys require different surface preparations.